

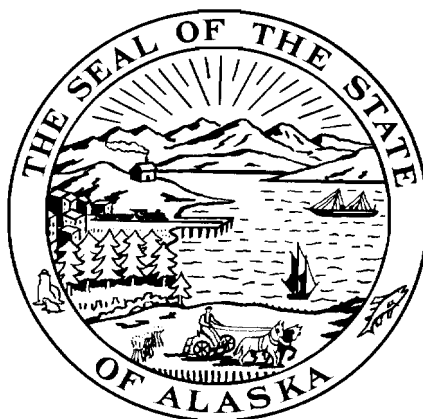
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STATE OF ALASKA

William A. Egan, Governor



ANNUAL REPORT OF PROGRESS, 1965 - 1966

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-7

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
Walter Kirkness, Commissioner

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INTRODUCTION

This report of progress consists of Job Segment Reports conducted under the State of Alaska Federal Aid in Fish Restoration Project F-5-R-7, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 18 separate studies. Some are specific to certain areas, species or fisheries, while others deal with a common need for information. Each job has been developed to meet the needs of various aspects of the State's recreational fishery resource. Seven jobs are designed to pursue the cataloging and inventory of the numerous State waters. These jobs, which are of a continuing nature, will eventually index the potential recreational fisheries. Four jobs are directed toward specific sport fish studies. These include specialized efforts toward the anadromous Dolly Varden of Southeastern Alaska, the silver salmon in Resurrection Bay, the king salmon stocks on the Lower Kenai Peninsula, the king salmon stocks in Upper Cook Inlet, and the Arctic grayling of the Tanana River system.

The statewide access program is developing rapidly. Our efforts in investigating existing and potential recreational sites and access has resulted in favorable action being taken on our proposals and recommendations submitted to the land management agencies at both the State and Federal levels.

The remaining jobs included a specialized creel census effort in Southeastern, an egg-take program designed to establish indigenous egg-take sources, and evaluation of the Fire Lake system.

Three special reports have been completed from past studies on the Dolly Varden study. These appear in the Department's "Research Report" series and are a direct result of the Federal Aid In Fish Restoration Program. To date, the following reports have been published: Research Report No. 3, "Some Migratory Habits of the Anadromous Dolly Varden Salvelinus malma (Walbaum) in Southeastern Alaska," 1965, Robert H. Armstrong; Research Report No. 4, "Annotated Bibliography on the Dolly Varden Char," 1965, Robert H. Armstrong; and Research Report No. 5, "Age and Growth of Anadromous Dolly Varden Char Salvelinus malma (Walbaum), in Eva Creek, Baranof Island, Southeastern Alaska," 1966, David W. Heiser.

The material contained in this progress report is often fragmentary in nature. The findings may not be conclusive and the interpretations contained herein are subject to re-evaluation as the work progresses.

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No.: F-5-R-7 Title: Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Southwest Alaska.

Job No.: 6-A

Period Covered: July 1, 1965 to June 30, 1966.

ABSTRACT

Surface area mapping was continued on seven Kodiak Island lakes. Lake survey cards were completed for seven new lakes and updated on three other lakes. Lake productivity studies included bottom sampling for 12 lakes, winter-summer pH and hardness comparisons for 11 lakes, and midsummer plankton comparisons among 6 major Kodiak lakes. Sport fish populations of rainbow trout, steelhead trout, Dolly Varden, king salmon, sockeye salmon, silver salmon and capelin were studied for distribution, abundance, timing and utilization. A Dolly Varden tagging program was begun and 418 fish were tagged. Egg-take source investigations and trial egg-takes were conducted on Dolly Varden and pink salmon. Public access assistance was given for seven lakes. Multiple-water use consultations were made concerning three new areas of development.

RECOMMENDATIONS

Steelhead trout distribution and population size need more intensive study on the south end of Kodiak Island so that a base of necessary data can be established for directing closer management.

Studies on small road side lakes in the Kodiak area should be reduced and emphasis redirected toward cataloging and inventorying major sport fishing streams on Kodiak and Afognak Islands.

The Dolly Varden tagging program should be continued, with particular effort made to tag a high proportion of the late spawners in American River.

A series of standardized aerial and ground counts should be maintained for king salmon on Karluk River and silver salmon on Chiniak Bay streams.

OBJECTIVES

1. To assess and inventory the environmental characteristics of the existing and potential fishery waters of the job area and, where practicable, obtain estimates of angler use and sport fish harvest.

2. To evaluate application of fishery restoration measures and availability of sport fish egg sources.
3. To assist as required in the investigation of public access status to the area's fishing waters.
4. To evaluate multiple water use development projects (public and private) and their effects on the area's streams, lakes and immediate coastal areas for the proper protection of the sport fish resources.

TECHNIQUES USED

Standard techniques were used in surface and volumetric mapping, in analysis of water samples, and in gill net sampling. A modified method of plankton reading was used in the plankton analysis. For more detailed information on these techniques, see the Techniques Used Section, Report No. 6-A, 1964-1965 Dingell-Johnson Project Report, Volume 6.

The lake bottom samples taken this year were made with a 9"x9" Ekman dredge. Random samples from three different depths and locations were taken for each lake. The collected samples were washed through a double frame of coarse and fine mesh screen; organisms were counted and recorded directly from the screens. The figures used are averages for each three-sample series.

FINDINGS

Assessment and Inventory of Sport Fish Environment and Resources

Lake mapping and sounding was continued this year in the Kodiak area for the following lakes:

<u>Lake Name and Number</u>	<u>Surface Acres</u>	<u>Volume in Acre Ft.</u>
Horseshoe (C.P. #34)	4.4	31.03
Pony (C.C. #42)	14.3	-
Heitman (B. #27)	32.4	-
Beaver (S.C. #16)	18.3	-
Rose Tead (P. #54)	234.0	-
Long (W.I. #62)	36.0	-
Dolgoi (L.I. #70)	51.6	-

Lake survey cards were completed for Pony, Heitman, Rose Tead, Long, Dolgoi, Summit, and A.L. #4 Lakes. In addition, cards were updated for Horseshoe, Beaver, and Lupine Lakes.

Lake productivity studies included bottom sampling, midsummer chemistry and plankton sampling, and late-winter oxygen checks.

Bottom sampling data collected in August are shown in Table 1. (The equipment used is shown in Figure 1.)

TABLE 1 - Kodiak Lakes Bottom Sampling, August, 1965.

Lake	Bottom Type	Organisms (mean counts per 9"x9" sample)					
		Large Clams (<i>Anodonta</i> sp.)	Small Clams (<i>Sphaeriidae</i>)	Snails (<i>Planorbidae</i>)	Amphipods (<i>Gammaridae</i>)	Annelids (<i>Oligochaeta</i>)	Caddis fly (<i>Trichoptera</i>)
Island	mud, silt	2	8	2	0	0	0
Buskin	sand	0	3	1	0	2	0
Genevieve	sand, silt	28	0	1	0	0	0
Margaret	silt	80	0	2	0	0	2
Jack	silt, mud	0	13	3	0	0	3
Lee	silt, sand	0	12	0	0	0	12
Caroline	silt, sand	0	1	0	0	0	22
Aurel	sand	0	33	36	0	0	21
Cicely	silt	0	30	0	0	0	2
Snag	mud, silt	0	17	0	1	1	1
Dragonfly	silt	0	59	2	0	0	1
Horseshoe	sand	0	10	0	1	9	0



FIGURE 1. Bottom Sample Being Emptied from Ekman Dredge onto Sifting Screens.

Water samples for pH and hardness were taken in midsummer (Aug., 1965) in 11 local lakes and compared with midwinter (Feb., 1965) values. These are shown in Table 2. It was noted that the summer pH values were consistently lower than corresponding samples taken in midwinter. This emphasizes the need for standardizing the time of year water samples are taken when making water chemistry comparisons.

TABLE 2 - Seasonal Comparison of Lake Water Samples.

Lake	Summer (Aug., 1965)			Winter (Feb., 1965)		
	pH	ppm	CaCO ₃	pH	ppm	CaCO ₃
Buskin	7.2	15		6.7	16	
Genevieve	7.0	12		6.6	20	
Margaret	7.1	18		6.5	26	
Caroline	6.8	8		6.4	22	
Aurel	6.8	10		6.4	20	
Cicely	6.8	5		6.1	24	
Jack	6.8	4		6.1	22	
Lee	6.9	4		6.0	12	
Snag	6.8	14		5.8	28	
Dragonfly	6.8	8		5.8	22	
Horseshoe	6.9	10		6.2	26	
MEAN VALUE	6.9	9.8		6.2	21.6	

Winter water samples were taken in February, 1966 from B. P. #40, Snag, Dragonfly, Long and Dolgoi Lakes. B. P. #40 (which remains saline below 7-1/2 ft.) had 12.0 ppm oxygen at 3-1/2 ft., but 0.0 ppm oxygen at 25 ft. Snag and Dragonfly, with 9.8 and 6.1 ppm oxygen, were better for fish survival than last year, although the pH values were still in the 5.8 - 6.1 range. Long and Dolgoi Lakes were abundant in dissolved oxygen and had pH readings of 6.6. (See figure 2 for sampling on Long Lake.)

In connection with mitigation investigations in the Earthquake Evaluation Program, a series of mid-August plankton and water samples of particular interest to lake productivity was taken from the major lakes on the south end of Kodiak Island (Table 3). It is noted that Fraser Lake and Saltery Lake appear the most productive, while Karluk and Red Lake show signs of over-grazing on zooplankton. Spiridon Lake indicates a low grazing rate for a moderately productive lake, and Uganik Lake shows extremely poor productivity.

Sport fish population evaluations were made throughout the year on rainbow and steelhead trout, Dolly Varden, silver, king, and sockeye salmon, and on marine capelin.



FIGURE 2. Winter Water Samples Being Taken From Long Lake, Woody Island.

TABLE 3 - Kodiak Lakes - Productivity Comparison.

Lake	pH	ppm CaCO ₃	Organisms in thousands per sq. surface meter					Larger Rotifers	Comments
			Copepods		Cladocerans				
			Adults	Nauplii	Holo- pedium	Daphnia	Bosmina		
Spiridon	7.2	22	144	5	0	12	2	31	No phytoplankton except some ceretium.
Fraser	7.0	18	64	275	21	9	31	73	Heavy phytoplankton of dinobryan, ceretium, colonial tabellaria.
Karluk	7.3	22	2	35	0	0	0	577	Small rotifers, no phytoplankton.
Red	7.1	16	7	213	0	14	35	277	Small rotifers, phytoplankton sparse.
Saltery	7.1	18	33	6	0	2	4	102	Abundant phytoplankton of dinobrya ceretium, colonial tabellaria.
Uganik	6.7	10	0	2	0	0	0	3	No phytoplankton, milky water.

The standardized June gill netting for rainbow trout, begun last year for Cliff Point and Bell's Flats lakes, was continued in June 1965. The results are shown in Table 4. A repeat sampling of Cicely Lake in July produced 6 rainbows of 1961 and 1962 age groups, indicating that the catch per hour values are subject to wide fluctuations.

In connection with lake cataloging, 1-hour experimental gill nets were set for trout in Lupine (N. C. #54), Bull (N. C. #55), Cascade (A. L. #1), and Heitman (B #27) Lakes. None of these sets produced fish except for one 12.0" trout of the 1961 age group taken from Lupine Lake.

Interviews with fly-in fishermen, and catches made during steel-head observations, have verified the existence of significant native rainbow populations in the following rivers of Kodiak and Afognak Islands:

- Paul's Lake System - in stream draining Laura L.
- Perenosia Cr. - in section above falls in June.
- Little Afognak Cr. - in stream just below lake.
- Afognak R. - in section above falls in June.
- Malina Cr. - in section below Lower Malina L.
- Barabara Cove Cr. - in lake outlet and creek.
- Saltery Cr. - scattered in river in May and June.
- Little River - in section below Little River Lake.
- Karluk R. - just below lake in June and Oct.
- Dog Salmon R. - in middle section of river in May and June.
- Olga Cr. - below lower lake in June.

Steelhead trout observations were made on the Buskin, Saltery, Dog Salmon, and Karluk Rivers.

All rumors of steelhead taken on the Buskin River were checked in the spring (1965) fishery, and a minimum of 60 man-days fishing effort accounted for. The verified total catch was only one steelhead taken on Buskin River and three steelhead taken in Buskin Lake.

Saltery Creek was observed on May 17, the approximate peak of spawning. Three fish were observed spawning in riffles one-half mile below the lake, and three spawned-out steelhead were taken by hook and line sampling from the mid-stream pool areas. Additional observations are needed to establish the approximate magnitude of the population.

Dog Salmon River was observed for steelhead on April 28, May 19, and October 12. The April 28 observations located unripe fish in abundance schooled in pools two miles below Fraser Lake. Fifteen steelhead were taken by hook-and-line sampling in one man-day of effort. A second trip on May 19, expending three man-days of effort took only two spawned-out fish. Shortly after this date spawning steelhead were reported taken by fly-in fishermen just below the falls. An incidental observation on October 12 showed that bright steelhead were in the river by this date. The Dog Salmon River steelhead average about 32 inches in length, significantly larger than the Buskin or Karluk River populations. Additional observations and tagging are needed to better establish the magnitude and timing of steelhead in this system.

TABLE 4 - 1965 Kodiak Lakes Sampling Rainbow Catches in June with Experimental Gill Net.

Lake	Brood Yr.	Catch/Hr.	Mean Length	Mean Wt.	Mean Scale Circuli Counts
Horseshoe	1961	1	10.2"	173 g.	13-14-12-8-0
	1962	3	8.9"	125 g.	12-14-6-0
Dragonfly	1961	0	-	-	-
	1962	14	7.0"	59 g.	11-13-6-0
Snag	1961	0	-	-	-
	1962	4	8.0"	106 g.	10-15-4-0
Lee	1961	3	10.3"	195 g.	11-11-10-3-0
	1962	2	8.1"	97 g.	9-14-5-0
Jack	1961	0	-	-	-
	1962	3	8.4"	116 g.	11-18-3-0
Ciceley	1961	0	-	-	-
	1962	0	-	-	-
Aurel	1961	1	10.4"	191 g.	11-10-10-6-0
	1962	0	-	-	-
Caroline	1961	1	11.3"	216 g.	11-20-12-6-0
	1962	1	9.3"	141 g.	11-23-9-0

Investigation observations were undertaken on the Karluk River on May 22, 23, October 5-7, and November 9-12 after it became apparent that the April 28 - May 9 management-sponsored egg-take in the portage area lacked sufficient information to conduct a successful operation. Twenty-two steelhead were tagged and released in the portage area in May. In October, observations were made on the upper spawning area, and on two fishing parties in the portage area. In November, a gill net was set and observations made at the lake outlet, the upper half of the river was drifted, and five man-days of fishing effort were spent in the portage area. These observations and other interviews indicate the following:

- (1) The steelhead run consists of two populations; one wintering in Karluk Lake and spawning in the upper mile of the river, and one wintering in the portage area and spawning in the lower half of the river.
- (2) The upper river population now appears to be the larger, while the previously major lower population appears to be in a seriously depleted state.
- (3) The composite run entering the river in October 1965 was even lower than the 1964 run, and may not be over 200 fish for both populations combined.
- (4) Until the past few years, the Karluk Indian Reservation subsistence take has included 3,000 to 5,000 steelhead. In 1965, with approximately equal effort, the catch had dropped to 150 fish. The fall and spring seasonal sport fish take in the past few years has been 80 to 100 steelhead.
- (5) Scale analysis indicates that most Karluk steelhead spend one or two years in fresh water and two years in the ocean, being three or four years old at spawning. The number of females spawning more than once is under ten percent. Approximately one-third of the males are jacks that have spent only one year in salt water.
- (6) No further egg-takes should be attempted in the management program until more intensive observations have better established the population size of both segments of the Karluk run.

Dolly Varden investigations were centered on the initiation of a tag-recovery program to determine the amount of intra-stream movement of adult fish in the Chiniak Bay area. The three waters chosen for tagging were the Buskin Lake and American River (non-lake) systems in Chiniak Bay, and the Saltery Lake system in Ugak Bay, 40 ocean miles from Chiniak Bay. The following tagged fish were released from mid-August to the end of October:

System -	Buskin	American	Saltery
Tag color -	Yellow	Red	White
No. tags -	177	46	195
Mean length -	14.3"	15.5"	14.6"

The few tags which have been returned to date have all been from the system where they were released.

Repeated Dolly Varden observations on the Buskin system from May to December revealed no new distribution or timing patterns, except for a nearly complete absence of Dolly Varden in the Buskin River in late September.

In the American River, Dolly Varden were observed in abundance from July until September 10, when the river was in flood. No fish re-appeared in the system until late October when a few fish were scattered in the spring-fed tributaries to spawn. Then in late November, 150 to 200 Dolly Varden were observed concentrated and actively spawning in deep pools in the main river. These fish had left the river by early February.

In mid-May, Dolly Varden were observed in a school of approximately 1,000 fish at the lake outlet of the Saltery system. No further observations were made until late September when several thousand fish were observed in the riffle area one-half mile below the lake outlet. These fish remained to ripen in this area until mid-October, then appeared to move up to the lake to spawn. No thorough observations were made on the lake.

From the Karluk River portage cabin log, it was established that king salmon fishing peaked at the Karluk River from June 21 to June 28. Approximately 70 fish were taken in the sport fishery, mostly by Navy personnel. On August 18 an aerial survey was made over the entire Karluk River. An estimated 540 kings were spawning in the section from the lake to the portage, and 310 kings were estimated below the portage. As 128 kings had been counted through the weir and into the lake, the minimum estimate for the entire system is 978 king salmon.

Silver salmon counts made in the streams of Chiniak Bay during November and December are as follows:

Stream	Count	Section Observed	Est. Stream Total
Buskin	477	Lake to warehouse pool	600
American	142	Bridge to forks	200
Old's	84	Bridge to 2 miles up	110
Roslyn	50	Bridge to 1-1/2 miles up	50
L. Rose Tead	158	Inlet and gravel pit	250

In the Buskin system, it was noted that the silvers entered the river and ascended to the lake during extreme high water approximately September 10. They ripened completely in the lake and descended to the riffles in the upper river to spawn from November 15 to November 30. The September sport fish take of about 80 fish was above average this year.

The sockeye salmon sport fishery on the Buskin River in June and early July took an estimated 120 fish, which was well below average due to continuous high water conditions. The Division of Commercial Fisheries aerially counted 1,600 sockeye beach spawning in Buskin Lake in August. Saltery and Afognak Rivers also contributed significantly to the local sockeye sport fishery, although no seasonal-take estimates were made for these systems.

A sport fishery developed along the sandy beaches of Chiniak Bay during the high night tides of June 1 and 2, when capelin, (Mallotus villosus) were spawning along Silver and Pony Beaches (Figure 3). Approximately 20 fishermen participated in taking these fish, and catches ran about two pounds per man. The June 15 and June 30 high tides were also checked, but no fish or fishermen were on the beaches at these times.

Investigations of Sport Fish Egg Sources

Dolly Varden egg-take sources were investigated in the Chiniak Bay area. In the Buskin system, scatterings of spawning fish were taken by gill net in Lake Genevieve and Bunker Creek, but the main concentration again this year was found off the mouth of Spring Creek. A total of 85 ripening Dolly Varden was taken by gill nets in this area from October 16 to October 28, and 30,000 eggs were obtained (Figure 4). Night observations made along Buskin Lake beaches showed that some Dolly Varden were utilizing the shallow lakeshore spring-fed areas to spawn at night. Observations were also made in Salomie Creek and American River and its tributaries. Few fish were seen in these areas and only 6,000 additional eggs were taken. It thus appears that adequate concentrations of Dolly Varden spawners cannot be found in these systems, and that egg-take efforts will have to be directed toward scattered Dolly Varden populations in several areas.

The main spring area of Spring Creek was investigated for its suitability for development into a field egg-eying installation for Dolly Varden eggs. The water temperature remains 38 to 40°F. during the winter, and the spring water is low in minerals and high in oxygen. Wooden 2x4 stakes and plywood were driven around part of the spring area to concentrate water flow. It was observed that the spring area contains enough flow for at least six troughs, and that a six-inch head could be obtained without apparent alteration of the spring flow. A short trough with three baskets was installed on a trial basis (Figure 5). The main problem that developed was repeated screen blockage due to grass and leaf debris caused from raising the pond level. Also, an inadequate surplus water spillway caused one area of the dam to eventually undermine. Therefore, no eggs were eyed in the trough, but these minor problems could be easily overcome. The area appears to have definite future potential. The 36,000 Dolly Varden eggs taken this year were eyed at the Kitoi Bay hatchery and shipped to New Mexico in mid-January.

A special request for 60,000 pink salmon eggs for Iceland necessitated investigating the pink salmon egg sources in the Kodiak area. Although an off-year in most of the area, the Buskin and Saltery systems each had about 30,000 spawners. A trip was made to Saltery Creek on August 16 to obtain eggs. However, the fish were not yet ripe and difficulty of access and lack of suitable pools made a beach seine operation impractical. From August 19 to 23, the first pink salmon began spawning in the Buskin River. An excellent pool area was found opposite the Ft. Greeley Reservoir inlet, and no difficulty was encountered in obtaining 100,000 eggs. These were eyed at the Naval Base hatchery and shipped to Iceland in mid-October with a reported in-transit loss of only 200 eggs.



FIGURE 3. Capelin (Mallotus villosus) collected on Kodiak Beaches in Early June.

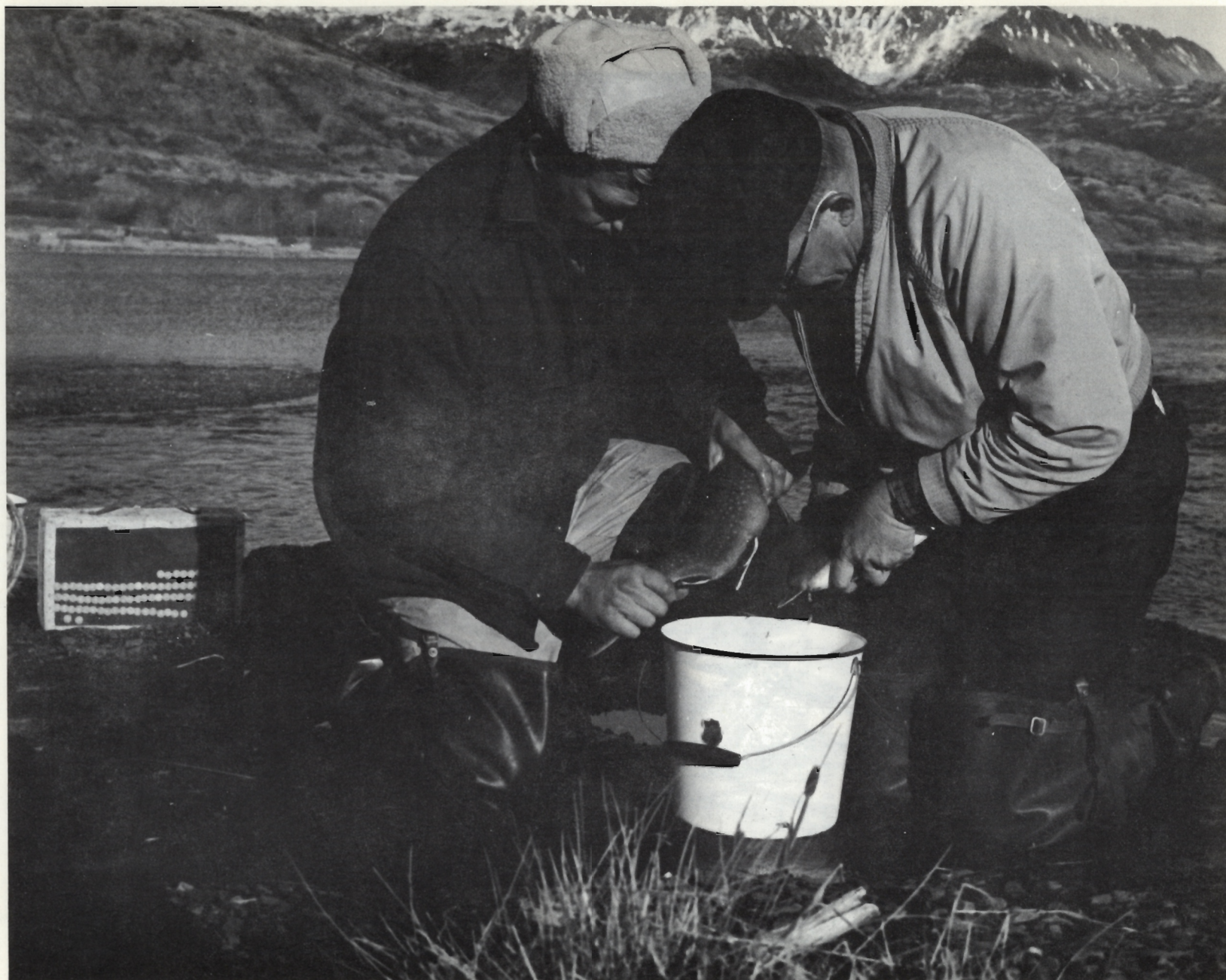


FIGURE 4. Eggs Being Taken from Dolly Varden at the Mouth of Spring Creek, Buskin Lake.



FIGURE 5. Egg Incubating Test Trough on Main Spring Area in Spring Creek.

Public Access Assistance

Assistance to public access was given by limited trail marking and improvement. The old, overgrown trail to Heitman Lake was located, brushed out, and marked by a roadside sign. This alpine lake of 32 acres, located just over one mile off the road above Cliff Point, immediately became popular with hike-in fishermen, although trout catches were light. Roadside signs were also installed for Snag, Dragonfly, Horseshoe, and Hidden Lakes, and minor trail improvements were made at Dragonfly and Hidden Lakes.

Evaluation of Multiple Water Usage

Interviews and recommendations were made at various times during the year on three development projects that will involve multiple water usage. These include:

- (1) The Terror Lake hydroelectric project being proposed by the Kodiak Electric Association. The watershed is being studied by the Bureau of River Basin Studies. Recommendations were made to require the power company to make provisions for stocking the lake with sport fish (rainbow trout) and to provide adequate screening to prevent loss of these fish from the lake.
- (2) A Buskin Lake antenna field herbicide program is proposed by the Department of Navy. Toxic herbicides would be introduced into the Buskin Lake and River watersheds. Fish population information for this important area was given to the Budocks Applied Biology representative.
- (3) The Bell's Flats Recreation Area proposed by the Department of Navy is to be turned over to the State. An evaluation of the sport fish resources in the area was given to the Navy to assist them in their preparation of the proposal.

A mid-summer water pollution check was made on Island Lake, where a trailer court development has been dumping improperly treated sewage into the lake. A standard five-tube presumptive coliform test was made in the main lake and side bays. The side bays were mildly polluted, while the main lake, with an MPN count of 16, was highly polluted. Although this has caused no winter oxygen deficiencies, and has actually greatly stimulated the plankton production in the lake, the lake has been made less attractive as a recreational area. Future action is planned by the Public Health Department.

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Date: March 9, 1966

Approved by:

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